<CHAPTER> **1**

Using a Fabric Extender with a Cisco Nexus 5000 Series Switch

This chapter describes the Cisco Nexus 2000 Series Fabric Extenders (FEXs) and includes these sections:

Information About Using a Fabric Extender with a Cisco Nexus 5000 Series Switch

The Cisco Nexus 2000 Series Fabric Extenders (FEXs) support Gigabit Ethernet and 10-Gigabit Ethernet environments while allowing transparent migration to 10-Gigabit Ethernet virtual machine aware unified fabric technologies. The Cisco Nexus 2000 Series FEXs behave as remote I/O modules for a parent Cisco Nexus 5000 Series switch. The FEX is an extension of the parent Cisco Nexus switch fabric, with the FEX and the parent Cisco Nexus switch together forming a virtual modular system.

A Cisco Nexus 2000 Series FEX forwards all the traffic to the parent Cisco Nexus 5000 Switch over 10-Gigabit Ethernet uplinks. Passing all traffic to the parent switch allows traffic to be shaped according to policies established on the parent Cisco Nexus 5000 Series switch with a single point of management.

Cisco Nexus 2248TP-E

The Cisco Nexus 2248TP-E is a stackable 1 RU 17.2-inch (45 cm) deep FEX that supports 48 1000-TX host-facing (downlink) ports and 4 10-Gigabit SFP+ network-facing (uplink) ports. You can order it with front-to-back or back-to-front air cooling, and with AC or DC power supplies.

You can use this FEX with the Cisco Nexus 5000 Series switch. The Cisco Nexus 2248TP-E is managed and configured by the upstream switch. The FEX software ships with the Cisco Nexus 5000 Series switch software. The FEX downloads the software image from the switch the same way that a module would download it from the supervisor in a modular chassis.

This section includes the following topics:

- Chassis, page 1-2
- Ports, page 1-3
- Power Supplies, page 1-3
- Fan Trays, page 1-7
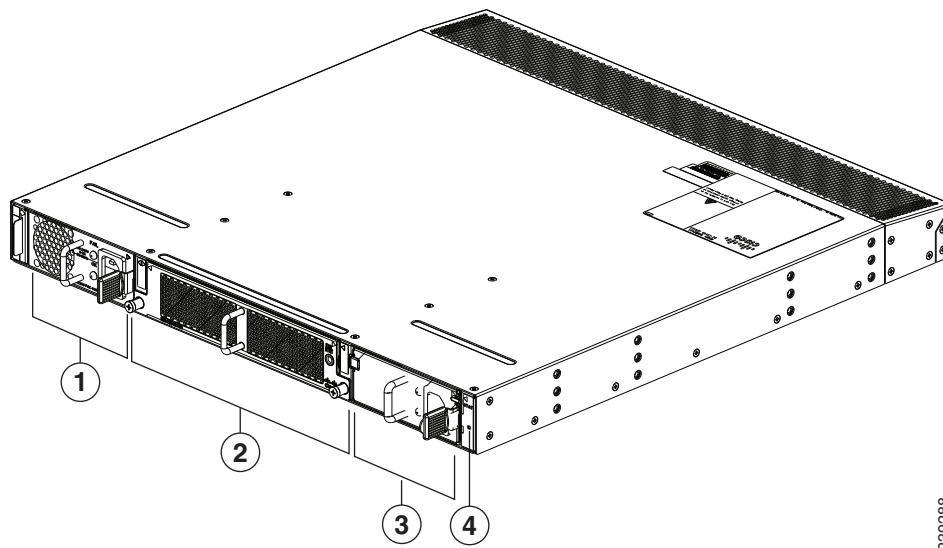- Supported Transceivers and Cables, page 1-9

Chassis

The Cisco Nexus 2248TP-E FEX chassis has a height of 1.72 inches (4.37 cm), a width of 17.3 inches (43.94 cm), and a depth of 17.7 inches (44.96 cm). It weighs 17.7 pounds (8.0 kg). Its one-rack-unit (1 RU) form factor takes up relatively little space, making it easy to incorporate into rack designs. The FEX is mounted in a standard 19-inch (48.26 cm) rack. All switch ports at the rear of the unit are in close proximity to server ports, and all user-serviceable components are accessible from the front panel.

You can order it with front-to-back or back-to-front air cooling, and with AC or DC power supplies. If you are going to install the chassis with its front end facing the cold aisle, you must order the chassis with front-to-back air flow. If you are going to install the chassis with its back end facing the cold aisle, you must order the chassis with back-to-front airflow.

Figure 1-1 shows the location of the components found on the front of the chassis, and Figure 1-2 shows the location of components found on the rear of the chassis. For information on what the chassis and component LEDs indicate, see Table D-1 on page D-2.
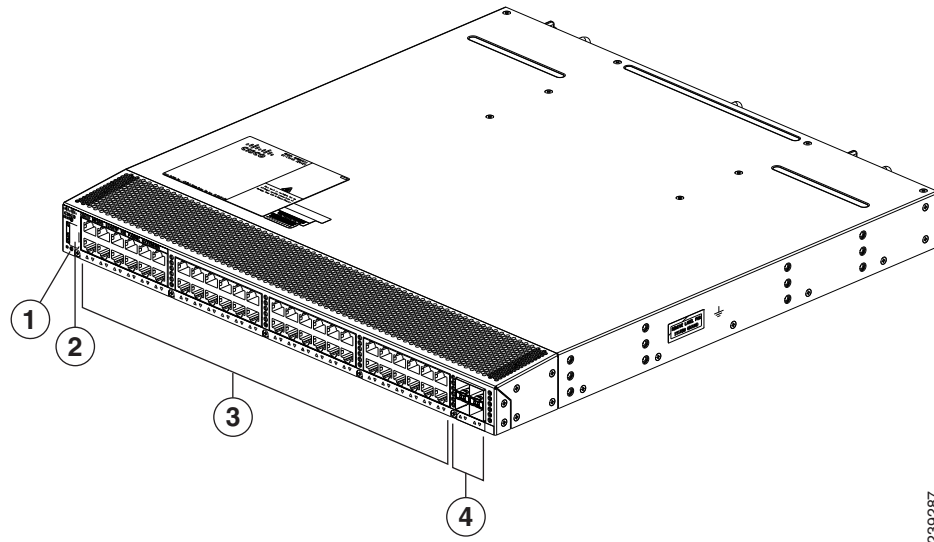
Figure 1-1   Front View of the Cisco Nexus 2248TP-E Chassis

1	Power supply	**3**	Power supply (blank shown)
2	Fan tray	**4**	Status (top) and ID (bottom) LEDs

Figure 1-2   Rear View of the Cisco Nexus 2248TP-E Chassis

1	Status (top) and ID (bottom) LEDs	**3**	100/1000 downlink ports (48)
2	HDMI port	**4**	SFP+ uplink ports (four)

Ports

The Cisco Nexus 2248TP-E FEX supports a total of 48 100/1000BASE-T ports and four 10-Gigabit Ethernet uplinks (SFP+). It provides two types of ports: host-facing downlink ports and network-facing uplink ports. Uplink ports are colored with yellow for connectivity to the upstream parent Cisco Nexus 5000 Series switch.

Power Supplies

The Cisco Nexus 2248TP-E FEX chassis has two bays for front-end AC or DC power supplies. This chassis is fully functional with one power supply, but you can install a second power supply for power redundancy. The power supply is hot swappable during operations.

Table 1-1 lists the power supplies that you can order with the Cisco Nexus 2248TP-E FEX.

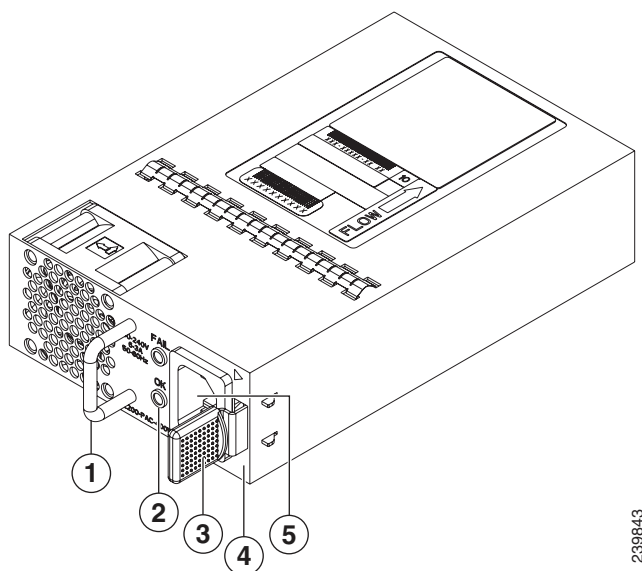*Table 1-1   Power Supplies for the Cisco Nexus 2200 Platform Chassis*

Power Supply	Part Number
AC power supply with front-to-back airflow	N2200-PAC-400W
AC power supply with back-to-front airflow	N2200-PAC-400W-B

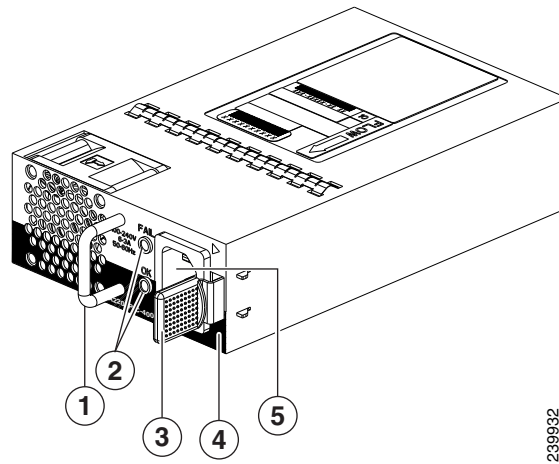*Table 1-1   Power Supplies for the Cisco Nexus 2200 Platform Chassis*

Power Supply	Part Number
DC power supply with front-to-back airflow	N2200-PDC-400W
DC power supply with with back-to-front airflow	N2200-PDC-350W-B

Figure 1-3 shows an AC power supply with front-to-back airflow. Figure 1-4 shows an AC power supply with back-to-front airflow. Figure 1-5 shows a DC power supply with front-to-back airflow. Figure 1-6 shows a DC power supply with back-to-front airflow.

Figure 1-3   AC Power Supply with Front-to-Back Airflow for the Cisco Nexus 2200 Platform Chassis
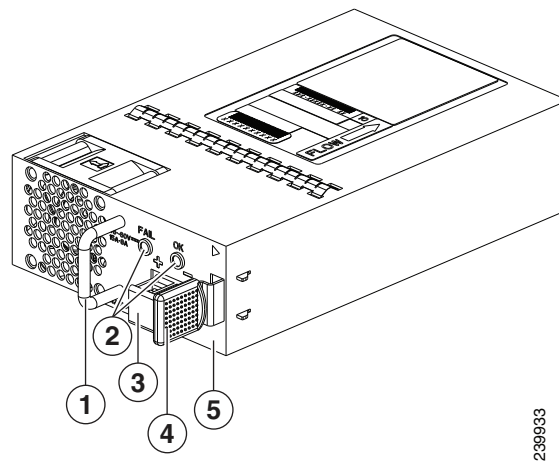

1	Handle	4	No black stripe (front-to-back airflow)
2	FAIL (top) and OK (bottom) LEDs	5	AC power receptacle
3	Ejector latch		

Figure 1-4   *AC Power Supply with Back-to-Front Airflow for the Cisco Nexus 2200 Platform*
                    Chassis

1	Handle	4	Black stripe (back-to-front airflow)
2	FAIL (top) and OK (bottom) LEDs	5	AC power receptacle
3	Ejector latch		

Figure 1-5   *DC Power Supply for the Cisco Nexus 2200 Platform Chassis*

1	Handle	4	Ejector latch
2	FAIL (left) and OK (right) LEDs	5	No black stripe (front-to-back airflow)
3	DC power receptacle		

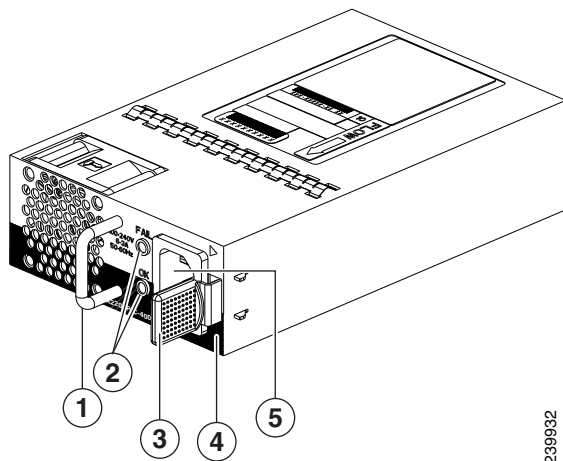***Figure 1-6   DC Power Supply with Back-to-Front Airflow for the Cisco Nexus 2200 Platform Chassis***

1	Handle	4	Black stripe (back-to-front airflow)
2	FAIL (top) and OK (bottom) LEDs	5	AC power receptacle
3	Ejector latch		

You can order the Cisco Nexus 2248TP-E FEX with AC power supplies that have front-to-back or back-to-front airflow for cooling or DC power supplies that offer front-to-back airflow. The back-to-front airflow components have a black stripe on their front surface for easy visual identification. The front-to-back airflow components do not have a black stripe.
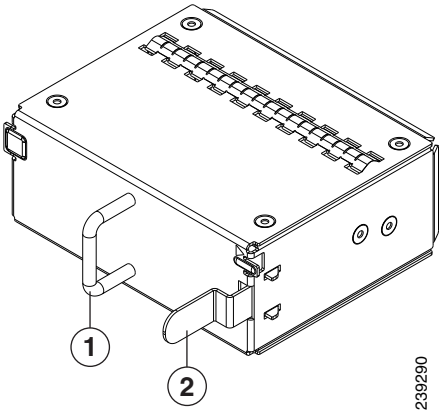
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Caution   Be sure that all of the power supply and fan tray modules in the same chassis have the same airflow direction and that the air intake for those modules is positioned on a cool aisle. If you install a module that uses a different direction of airflow from the other modules in your system, you will see an error message. If you position a chassis with its modules taking cooling air from a warm aisle, the switch can reach an overtemperature state and shut down.

If one power supply is installed in the chassis, but the other power supply slot is empty, you should use a blank filler panel (part number N2200-P-BLNK) to cover the empty slot. Figure 1-7 shows a blank power supply filler panel.

Figure 1-7   Blank Power Supply Filler Panel for the Cisco Nexus 2200 Platform Chassis

1	Handle	2	Ejector latch

For power supply specifications, see the "Power Specifications" section on page B-1. To replace a power supply, see the "Removing and Installing Power Supplies" section on page 3-17. For LED descriptions, see Table D-1 on page D-2.
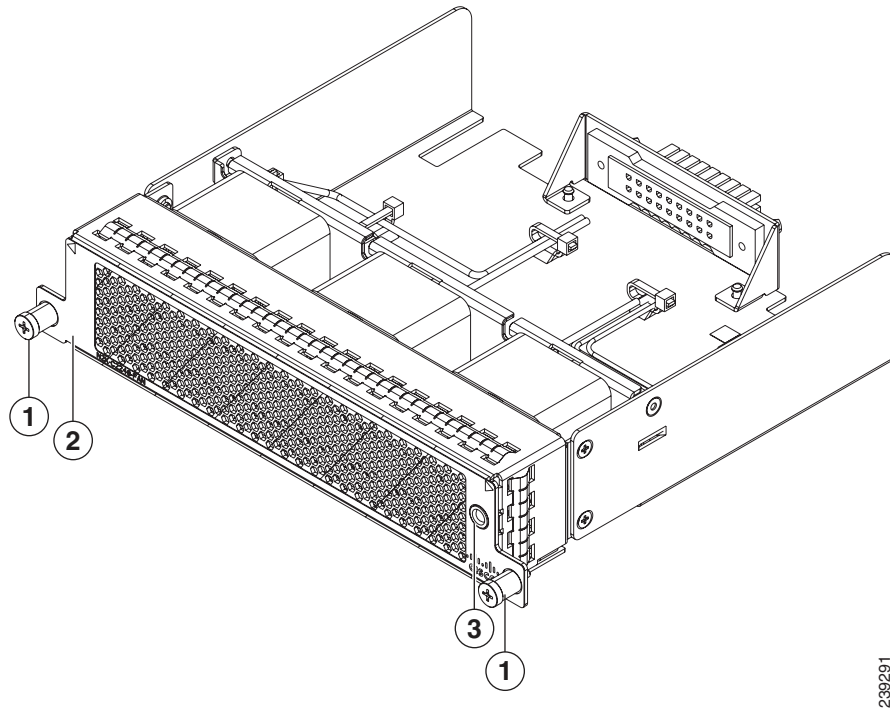
Fan Trays

The Cisco Nexus 2248TP-E FEX has one fan tray that is hot swappable during operations. Depending on the arrangement of hot and cold aisles in your data center, you can order front-to-back airflow to position the front of the FEX chassis in a cold aisle or back-to-front airflow to position the back of the FEX chassis in a cold aisle. Table 1-2 lists the part numbers for each of the fan trays that you can use with the Cisco Nexus 2248TP-E chassis.

Table 1-2   Fan Trays for the Cisco Nexus 2248TP-E FEXs

Description	Part Number
Front-to-back airflow	N2K-C2248TP-FAN
Back-to-front airflow	N2K-C2248TP-FAN-B

Figure 1-8 shows a front-to-back airflow fan tray, and Figure 1-9 shows a back-to-front airflow fan tray.

Figure 1-8   Front-to-Back Airflow Fan Tray Components for the Cisco Nexus 2248TP-E and 2224TP FEXs

1	Captive screws (2)	**3**	Status LED
2	No black stripe indicates front-to-back airflow		

Figure 1-9   Back-to-Front Airflow Fan Tray for the Cisco Nexus 2248TP-E FEX

1	Captive screws (2)	3	Status LED
2	Black stripe indicates back-to-front airflow		

To replace a fan tray, see the . For LED descriptions, see .

Supported Transceivers and Cables

The Cisco Nexus 2248TP-E FEX supports SFP+ Ethernet transceivers. This section includes the following topics:

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SFP Transceivers

The enhanced Small-Form-Factor Pluggable (SFP+) 10-Gigabit Ethernet transceiver is a bidirectional device with a transmitter and receiver. It has a 20-pin connector on the electrical interface and duplex LC connector on the optical interface. Currently, the Cisco Nexus 2248TP-E FEX supports the short-range SFP and long-range SFP transceiver. Table 1-3 describes the SFP+ transceivers used with the Cisco Nexus 2248TP-E FEX.

Table 1-3   SFP Transceivers for the Cisco Nexus 2248TP-E FEX

Model	Description
N2200 FET	10-Gigabit Ethernet for connections with a Cisco Nexus 5000 Series switch
SFP-10-Gigabit -SR	10-Gigabit Ethernet—short range SFP+ module
SFP-10-Gigabit -LR	10-Gigabit Ethernet—long range SFP+ module

SFP+ Copper Cables

Copper interface cables are available for use with the 10-Gigabit Ethernet SFP+ transceiver. Table 1-4 lists the available cables and provides a brief description of the cables.

Table 1-4   Copper Cables for the Cisco Nexus 2248TP-E FEX

Model	Description
SFP-H10GB-CU1M	10-Gigabit BASE-CU SFP+ Passive Cable (1 meter)
SFP-H10GB-CU3M	10-Gigabit BASE-CU SFP+ Passive Cable (3 meters)
SFP-H10GB-CU5M	10-Gigabit BASE-CU SFP+ Passive Cable (5 meters)

Cisco Nexus 2248TP

The Cisco Nexus 2248TP is a stackable 1 RU 17.2-inch (45 cm) deep FEX that supports 48 1000-TX host-facing (downlink) ports and 4 10-Gigabit SFP+ network-facing (uplink) ports. You can order it with front-to-back or back-to-front air cooling, and with AC or DC power supplies.

You can use this FEX with the Cisco Nexus 5000 Series switch. The Cisco Nexus 2248TP is managed and configured by the upstream switch. The FEX software ships with the Cisco Nexus 5000 Series switch software. The FEX downloads the software image from the switch the same way that a module would download it from the supervisor in a modular chassis.

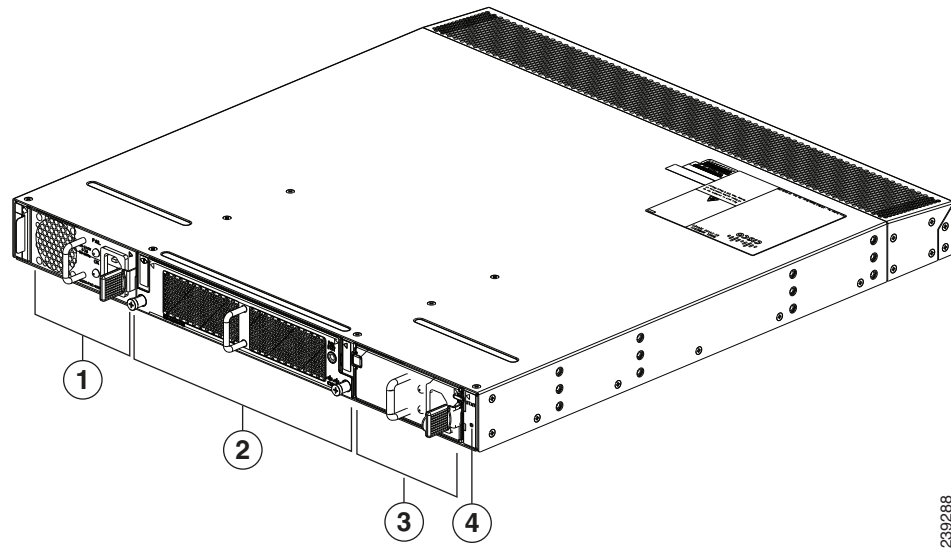This section includes the following topics:

Chassis

The Cisco Nexus 2248TP FEX chassis has a height of 1.72 inches (4.37 cm), a width of 17.3 inches (43.94 cm), and a depth of 17.7 inches (44.96 cm). It weighs 17.7 pounds (8.0 kg). Its one-rack-unit (1 RU) form factor takes up relatively little space, making it easy to incorporate into rack designs. The FEX is mounted in a standard 19-inch (48.26 cm) rack. All switch ports at the rear of the unit are in close proximity to server ports, and all user-serviceable components are accessible from the front panel.

You can order it with front-to-back or back-to-front air cooling, and with AC or DC power supplies. If you are going to install the chassis with its front end facing the cold aisle, you must order the chassis with front-to-back airflow. If you are going to install the chassis with its back end facing the cold aisle, you must order the chassis with back-to-front airflow.
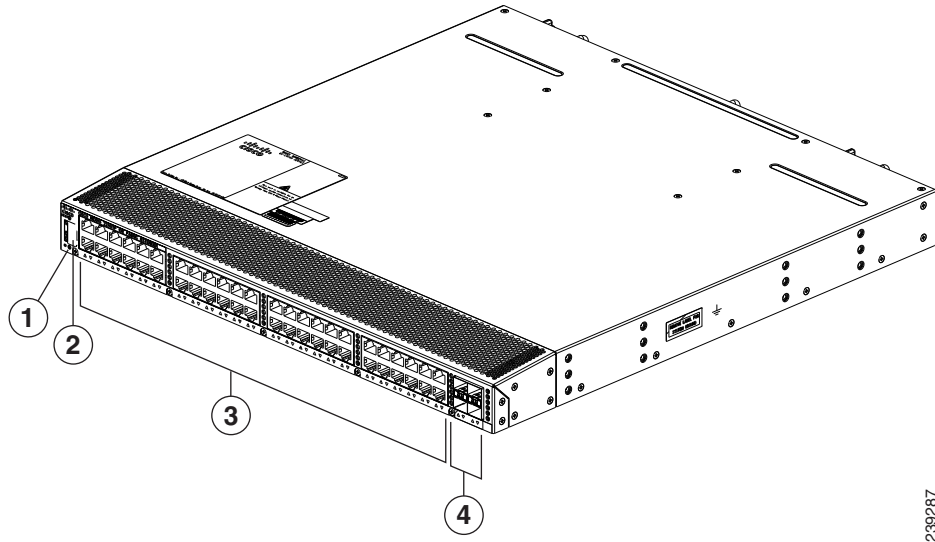
Figure 1-10 shows the location of the components found on the front of the chassis, and Figure 1-11 shows the location of components found on the rear of the chassis. For information on what the chassis and component LEDs indicate, see Table D-1 on page D-2.

Figure 1-10   *Front View of the Cisco Nexus 2248TP Chassis*

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1	Power supply	**3**	Power supply (blank shown)
2	Fan tray	**4**	Status (top) and ID (bottom) LEDs

Figure 1-11   *Rear View of the Cisco Nexus 2248TP Chassis*

239287

1	Status (top) and ID (bottom) LEDs	**3**	100/1000 downlink ports (48)
2	HDMI port	**4**	SFP+ uplink ports (four)

Ports

The Cisco Nexus 2248TP FEX supports a total of 48 100/1000BASE-T ports and four, 10-Gigabit Ethernet uplinks (SFP+). It provides two types of ports: host-facing downlink ports and network-facing uplink ports. Uplink ports are differentiated with yellow for connectivity to the upstream parent Cisco Nexus 5000 Series switch.

Power Supplies

The Cisco Nexus 2248TP FEX chassis has two bays for front-end AC or DC power supplies. This chassis is fully functional with one power supply, but you can install a second power supply for power redundancy. The power supply is hot swappable during operations.
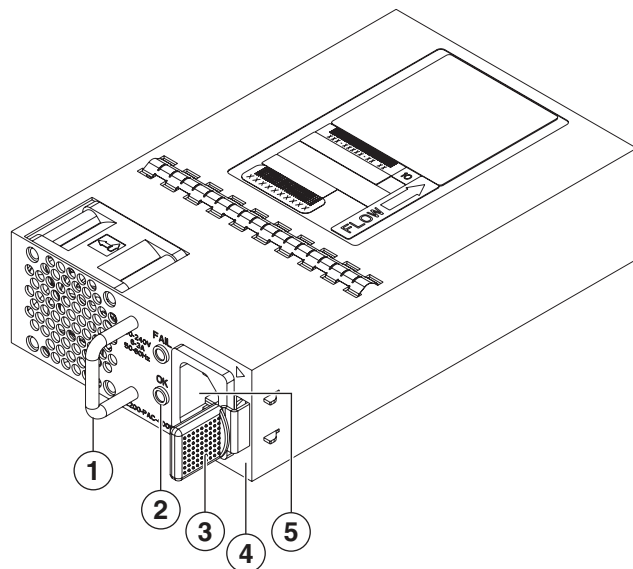
Table 1-5 lists the power supplies that you can order with the Cisco Nexus 2248TP FEX.

Table 1-5   Power Supplies for the Cisco Nexus 2200 Platform Chassis

Power Supply	Part Number
AC power supply with front-to-back airflow	N2200-PAC-400W
AC power supply with back-to-front airflow	N2200-PAC-400W-B
DC power supply with front-to-back airflow	N2200-PDC-400W
DC power supply with back-to-front airflow	N2200-PDC-350W-B

Figure 1-12 shows an AC power supply with front-to-back airflow. Figure 1-13 shows an AC power supply with back-to-front airflow. Figure 1-14 shows a DC power supply with front-to-back airflow.

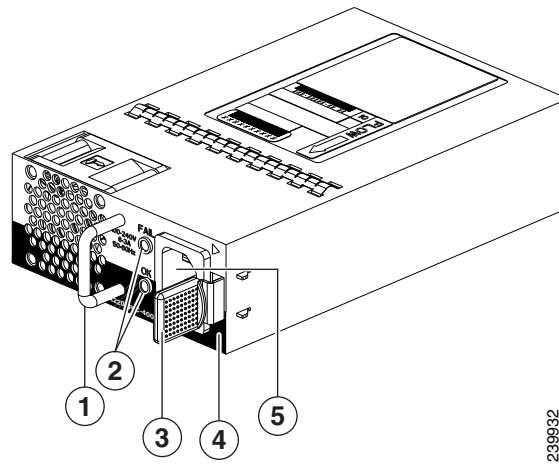*Figure 1-12   AC Power Supply with Front-to-Back Airflow for the Cisco Nexus 2200 Platform Chassis*

1	Handle	4	No black stripe (front-to-back airflow)
2	OK (top) and FAULT (bottom) LEDs	5	AC power receptacle
3	Ejector latch		

Figure 1-13   ***AC Power Supply with Back-to-Front Airflow for the Cisco Nexus 2200 Platform Chassis***

1	Handle	4	Black stripe (back-to-front airflow)
2	FAULT (top) and OK (bottom) LEDs	5	AC power receptacle
3	Ejector latch		

Figure 1-14   ***DC Power Supply with Front-to-Back Airflow for the Cisco Nexus 2200 Platform Chassis***

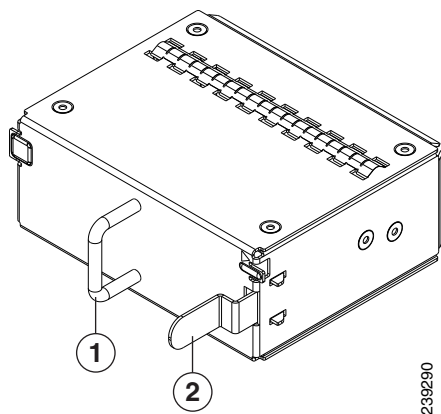| 1	Handle	4	Ejector latch
2	FAULT (top) and OK (bottom) LEDs	5	No black stripe (front-to-back airflow)
3	DC power receptacle		

You can order the Cisco Nexus 2248TP FEX with AC power supplies that have front-to-back or back-to-front airflow for cooling or DC power supplies that offer front-to-back airflow. The back-to-front airflow components have a black stripe on their front surface for easy visual identification. The front-to-back airflow components do not have a black stripe.

Caution Be sure that all of the power supply and fan tray modules in the same chassis have the same airflow direction and that the air intake for those modules is positioned on a cool aisle. If you install a module that uses a different direction of airflow from the other modules in your system, you will see an error message. If you position a chassis with its modules taking cooling air from a warm aisle, the switch can reach an overtemperature state and shut down.

If one power supply is installed in the chassis, but the other power supply slot is empty, you should use a blank filler panel (part number N2200-P-BLNK) to cover the empty slot. Figure 1-15 shows a blank power supply filler panel.

Figure 1-15   Blank Power Supply Filler Panel for the Cisco Nexus 2200 Platform Chassis

1	Handle	2	Ejector latch

For power supply specifications, see the "Power Specifications" section on page B-1. To replace a power supply, see the "Removing and Installing Power Supplies" section on page 3-17. For LED descriptions, see Table D-1 on page D-2.
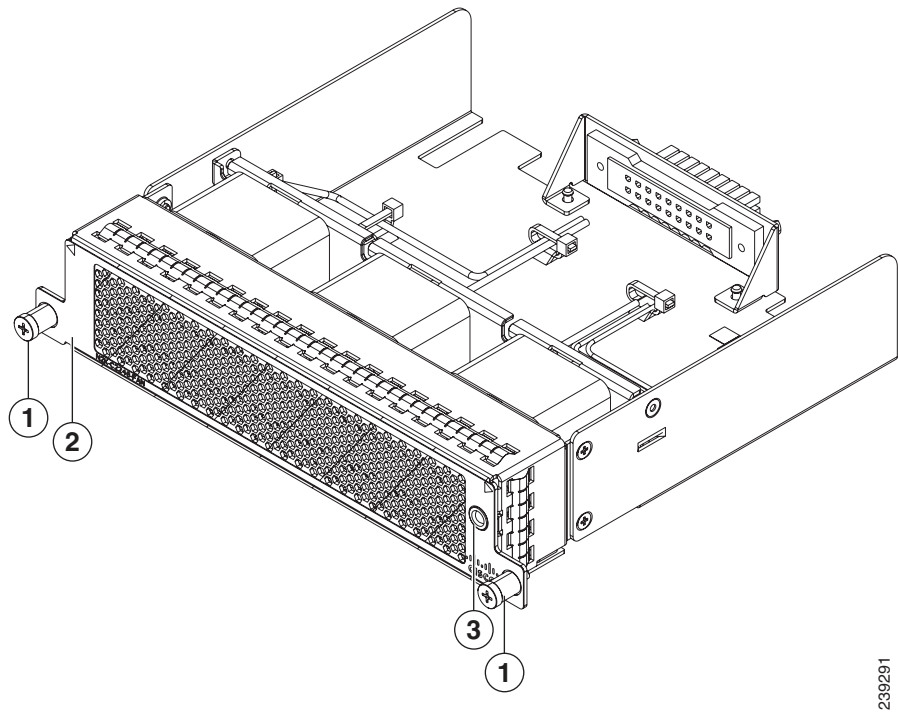
Fan Tray

The Cisco Nexus 2248TP (and 2224TP) FEX has one fan tray that is hot swappable during operations. Depending on the arrangement of hot and cold aisles in your data center, you can order front-to-back airflow to position the front of the FEX chassis in a cold aisle or back-to-front airflow to position the back of the FEX chassis in a cold aisle. Table 1-6 lists the part numbers for each of the fan trays that you can use with the Cisco Nexus 2248TP and 2224TP chassis.

Table 1-6   Fan Trays for the Cisco Nexus 2248TP and 2224TP FEXs

Description	Part Number
Front-to-back airflow	N2K-C2248-FAN
Back-to-front airflow	N2K-C2248-FAN-B

Figure 1-16 shows a front-to-back airflow fan tray, and Figure 1-17 shows a back-to-front airflow fan tray.

Figure 1-16   Front-to-Back Airflow Fan Tray Components for the Cisco Nexus 2248TP and 2224TP FEXs

1	Captive screws (2)	**3**	Status LED
2	No black stripe indicates front-to-back airflow		

1	Captive screws (2)	**3**	Status LED
2	Black stripe indicates back-to-front airflow		

To replace a fan tray, see the "Removing and Installing the Fan Tray" section on page 3-20. For LED descriptions, see Table D-1 on page D-2.

Supported Transceivers and Cables

The Cisco Nexus 2248TP FEX supports SFP+ Ethernet transceivers. This section includes the following topics:

- SFP Transceivers, page 1-16
- SFP+ Copper Cables, page 1-17

SFP Transceivers

The enhanced Small-Form-Factor Pluggable (SFP+) 10-Gigabit Ethernet transceiver is a bidirectional device with a transmitter and receiver. It has a 20-pin connector on the electrical interface and duplex LC connector on the optical interface. Currently, the Cisco Nexus 2248TP FEX supports the short-range SFP and long-range SFP transceiver. Table 1-7 describes the SFP+ transceivers used with the Cisco Nexus 2248TP FEX.

Table 1-7   SFP Transceivers used with the Cisco Nexus 2248TP FEX

Model	Description
N2200 FET	10-Gigabit Ethernet for connections with a Cisco Nexus 5000 Series switch
SFP-10-Gigabit -SR	10-Gigabit Ethernet—short range SFP+ module
SFP-10-Gigabit -LR	10-Gigabit Ethernet—long range SFP+ module

SFP+ Copper Cables

Copper interface cables are available for use with the 10-Gigabit Ethernet SFP+ transceiver. Table 1-8 lists the available cables and provides a brief description of the cables.

Table 1-8   Copper Cables Used with the Cisco Nexus 2248TP FEX

Model	Description
SFP-H10GB-CU1M	10-Gigabit BASE-CU SFP+ Passive Cable (1 meter)
SFP-H10GB-CU3M	10-Gigabit BASE-CU SFP+ Passive Cable (3 meters)
SFP-H10GB-CU5M	10-Gigabit BASE-CU SFP+ Passive Cable (5 meters)

Cisco Nexus 2248PQ

The Cisco Nexus 2248PQ is a stackable 1 RU 17.2 inch (45 cm) deep FEX that supports high-density 10-Gigabit Ethernet environments and has 48 1/10-Gigabit SFP+ host interfaces and 4 QSFP+ (16 10-Gigabit) on network interfaces. QSFP+ connectivity simplifies cabling while lowering power and solution costs. You can order it with front-to-back or back-to-front air cooling, which makes this FEX compatible with hot-aisle, cold aisle data center designs.

You can use this FEX with the Cisco Nexus 5500 Series switch and the Cisco Nexus 6004 parent switch (The supported software is Cisco Nexus OS Release 6.0(2)N1(1)). The Cisco Nexus 2248PQ is managed and configured by the upstream switch. The FEX software ships with the Cisco Nexus 5500 Series switch software. The FEX downloads the software image from the switch the same way that a module would download it from the supervisor in a modular chassis.

This section includes the following topics:

Chassis

The Cisco Nexus 2248PQ FEX chassis has a height of 1.72 inches (4.37 cm), a width of 17.3 inches (43.94 cm), and a depth of 17.7 inches (44.96 cm). It weighs 17.5 pounds (8.0 kg). Its one-rack-unit (1 RU) form factor takes up relatively little space, making it easy to incorporate into rack designs. The FEX is mounted in a standard 19-inch (48.26 cm) rack. All of the switch ports at the rear of the chassis are in close proximity to server ports, and all user-serviceable components are accessible from the front panel.

You can order front-to-back airflow or back-to-front airflow for cooling. If you are going to install the chassis with its front end facing the cold aisle, you must order the chassis with front-to-back air flow. If you are going to install the chassis with its back end facing the cold aisle, you must order the chassis with back-to-front airflow.

Ports

The Cisco Nexus 2248PQ FEX supports a total of 48 1/10-Gigabit Ethernet/Fibre Channel over Ethernet (FCoE) ports (SFP+) and 4 QSFP+ (16 10-Gigabit) fabric ports. The Cisco Nexus 2248PQ provides two types of ports: ports for end-host attachments and uplink ports. Uplink ports are differentiated with yellow for connectivity to the upstream parent Cisco Nexus 5000 Series switch.

The Cisco Nexus 2248PQ 10GE Fabric Extender supports FCoE and Data Center Bridging (DCB) which increases the reliability, efficiency, and scalability of Ethernet networks by allowing the switches to support multiple traffic classes over a lossless Ethernet fabric, enabling consolidation of LAN, SAN, and cluster environments.

Power Supplies

The Cisco Nexus 2248PQ FEX chassis has two bays for front-end AC or DC power supplies. This chassis is fully functional with one power supply, but you can install a second power supply for power redundancy. The power supply is hot swappable during operations.

Table 1-9 lists the power supplies that you can order with the Cisco Nexus 2248PQ FEX.

Table 1-9   Power Supplies for the Cisco Nexus 2200 Platform Chassis

Power Supply	Part Number
AC power supply with front-to-back airflow	N2200-PAC-400W
AC power supply with back-to-front airflow	N2200-PAC-400W-B
DC power supply with front-to-back airflow	N2200-PDC-400W
DC power supply with back-to-front airflow	N2200-PDC-350W-B

Figure 1-12 on page 1-12 shows an AC power supply with front-to-back airflow. Figure 1-13 on page 1-13 shows an AC power supply with back-to-front airflow. Figure 1-14 on page 1-13 shows a DC power supply with front-to-back airflow.

You can order the Cisco Nexus 2248PQ FEX with AC power supplies that have front-to-back or back-to-front airflow for cooling or DC power supplies that have front-to-back airflow. The back-to-front airflow components have a black stripe on their front surface for easy visual identification. The front-to-back airflow components do not have a black stripe.

Table 1-5 on page 1-12 lists the power supplies that you can order with the Cisco Nexus 2200 Platform FEXs.

> **Caution**   Be sure that all of the power supply and fan tray modules in the same chassis have the same airflow direction and that the air intake for those modules is positioned on a cool aisle. If you install a module that uses a different direction of airflow from the other modules in your system, you will see an error message. If you position a chassis with its modules taking cooling air from a warm aisle, the switch can reach an overtemperature state and shut down.

If one power supply is installed in the chassis, but the other power supply slot is empty, you should use a blank filler panel (N2200-P-BLNK) to cover the empty slot. Figure 1-15 on page 1-14 shows a blank power supply filler panel.

For power supply specifications, see Table B-1 on page B-2. To replace a power supply, see the "Removing and Installing Power Supplies" section on page 3-17.

> **Caution**   Hot swapping of different direction fans and power supplies is not supported.

Fan Trays

The Cisco Nexus 2248PQ FEX has one fan tray that is hot swappable during operations. Depending on whether there is a cold aisle in front of or in back of the chassis, you can order front-to-back airflow or back-to-front airflow for the fan tray and the power supplies in the same chassis. Table 1-10 lists the part numbers for each of the fan trays that you can use with this chassis.

Table 1-10   Fan Trays for the Cisco Nexus 2248PQ FEX

Description	Part Number
Front-to-back airflow (port side exhaust, Blue color coded fans)	NXA-FAN-30CFM-F
Back-to-front airflow (port side cold air intake, Red color coded fans)	NXA-FAN-30CFM-B

To replace a fan tray, see the "Removing and Installing the Fan Tray" section on page 3-20. For LED descriptions, see Table D-1 on page D-2.

Supported SFP+ Transceivers

The Cisco Nexus 2248PQ Series FEX supports SFP+ Ethernet transceivers. This section includes the following topics:

- QSFP+ Transceivers, page 1-20
- SFP Transceivers, page 1-36
- SFP+ Copper Cables, page 1-36

QSFP+ Transceivers

Table 1-11 lists the supported QSFP+ transceivers and provides a brief description of each.

Table 1-11   QSFP+ Transceivers Used with the Cisco Nexus 2248PQ FEX

Model	Description
QSFP-40G-SR4	40GBASE-SR4 QSFP module, (multi-mode fiber, MMF at 100m)
QSFP-40G-CSR4	40GBASE Extended CSR4 QSFP module, (multi-mode fiber, MMF at 300m)
QSFP-H40G-CU1M	Cisco 40GBASE-CR4 QSFP+ direct-attach copper cable, 1-meter, passive
QSFP-H40G-CU3M	Cisco 40GBASE-CR4 QSFP+ direct-attach copper cable, 3-meter, passive
QSFP-H40G-CU5M	Cisco 40GBASE-CR4 QSFP+ direct-attach copper cable, 5-meter, passive
QSFP-4SFP10G-CU1M	Cisco 40GBASE-CR4 QSFP+ to 4 10GBASE-CU SFP+ direct-attach breakout cable, 1-meter, passive
QSFP-4SFP10G-CU3M	Cisco 40GBASE-CR4 QSFP+ to 4 10GBASE-CU SFP+ direct-attach breakout cable, 3-meter, passive
QSFP-4SFP10G-CU5M	Cisco 40GBASE-CR4 QSFP+ to 4 10GBASE-CU SFP+ direct-attach breakout cable, 5-meter, passive
QSFP-H40G-AC7M	Cisco 40GBASE-CR4 QSFP+ direct-attach copper cable, 7-meter, active
QSFP-H40G-AC10M	Cisco 40GBASE-CR4 QSFP+ direct-attach copper cable, 10-meter, active
QSFP-4X10G-AC7M	Cisco 40GBASE-CR4 QSFP+ to 4 10GBASE-CU SFP+ direct-attach breakout cable, 7-meter, active
QSFP-4X10G-AC10M	Cisco 40GBASE-CR4 QSFP+ to 4 10GBASE-CU SFP+ direct-attach breakout cable, 10-meter, active

SFP+ Transceivers

The enhanced Small-Form-Factor Pluggable (SFP+) 10-Gigabit Ethernet transceiver is a bidirectional device with a transmitter and receiver. It has a 20-pin connector on the electrical interface and duplex LC connector on the optical interface. Currently, the Cisco Nexus 2000 Series FEX supports the short-range SFP and long-range SFP transceiver. Table 1-12 describes the SFP+ transceivers used with the Cisco Nexus 2248PQ FEX.

Table 1-12   SFP+ Transceivers Used with the Cisco Nexus 2248PQ FEX

Model	Description
SFP-10G-SR	10-Gigabit Ethernet—short range SFP+ module
SFP-10G-LR	10-Gigabit Ethernet—long range SFP+ module
SFP-10G-ER	10-Gigabit Ethernet—extended reach SFP+ module

SFP+ Copper Cables

Copper interface cables are available for use with the 10-Gigabit Ethernet SFP+ transceiver. Table 1-13 lists the available cables and provides a brief description of the cables.

Table 1-13   Copper Cables Used with the Cisco Nexus 2248PQ FEX

Model	Description
SFP-H10GB-CU1M	10-Gigabit BASE-CU SFP+ Passive Cable (1 meter)
SFP-H10GB-CU3M	10-Gigabit BASE-CU SFP+ Passive Cable (3 meters)
SFP-H10GB-CU5M	10-Gigabit BASE-CU SFP+ Passive Cable (5 meters)
SFP-H10GB-CU7MA	10-Gigabit BASE-CU SFP+ Active Cable (7 meters)
SFP-H10GB-CU10MA	10-Gigabit BASE-CU SFP+ Active Cable (10 meters)

Cisco Nexus 2232TM-10GE, Cisco NexusN2K-C2232TM-E-10GE

The Cisco Nexus 2232TM-10GE is a stackable 1 RU 17.72 inch (45 cm) deep FEX that supports 32 1/10-Gigabit Base-T host-facing (downlink) ports and 8 10-Gigabit Ethernet (SFP+) network-facing (uplink) ports through an uplink module.

You can use this FEX with the Cisco Nexus 5000 Series switch. The Cisco Nexus 2232TM-10GE is managed and configured by the upstream switch. The FEX software ships with the Cisco Nexus 5000 Series switch software. The FEX downloads the software image from the switch the same way that a module would download it from the supervisor in a modular chassis.

You can use the Cisco Nexus 2232TM-E-10GE with the Cisco Nexus 5000 Series switch starting in the NX-OS 5.2(1)N1(1) rlease and beyond

This section includes the following topics:

- Chassis, page 1-21
- Ports, page 1-23
- Power Supplies, page 1-24
- Fan Trays, page 1-25
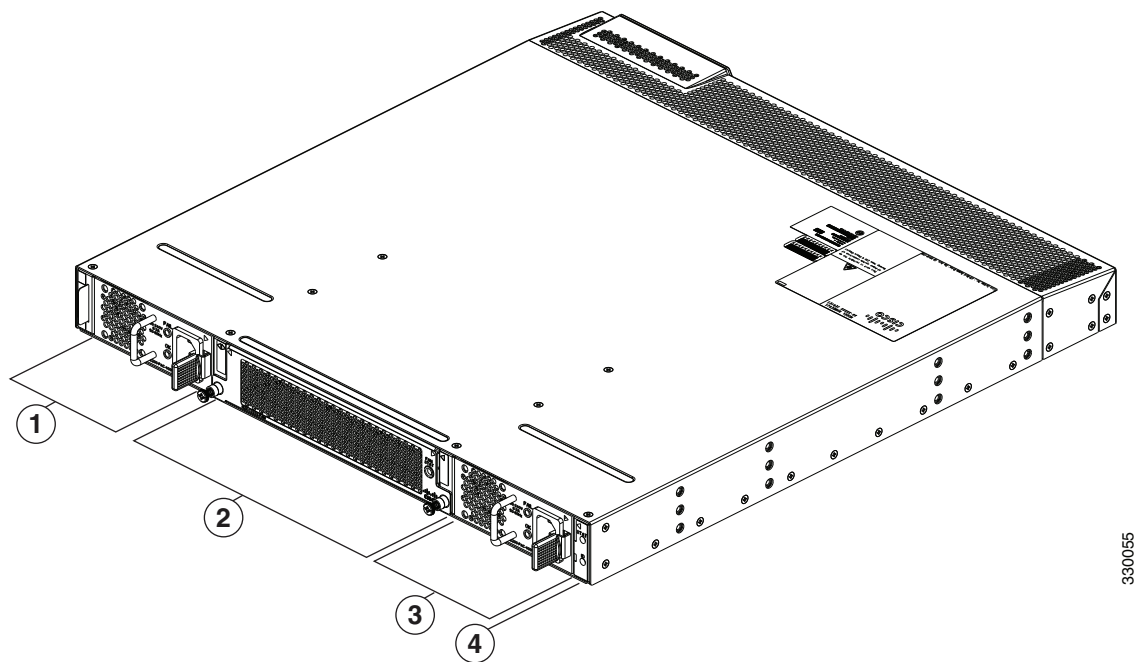- Supported Transceivers and Cables, page 1-26

Chassis

The Cisco Nexus 2232TM FEX chassis has a height of 1.72 inches (4.37 cm), a width of 17.3 inches (43.94 cm), and a depth of 17.7 inches (44.96 cm). It weighs 18.5 pounds (8.4 kg). Its one-rack-unit (1 RU) form factor takes up relatively little space, making it easy to incorporate into rack designs. The FEX

is mounted in a standard 19-inch (48.26 cm) rack and supports vertical orientation. All of the switch ports at the rear of the chassis are in close proximity to server ports, and all user-serviceable components are accessible from the front panel.
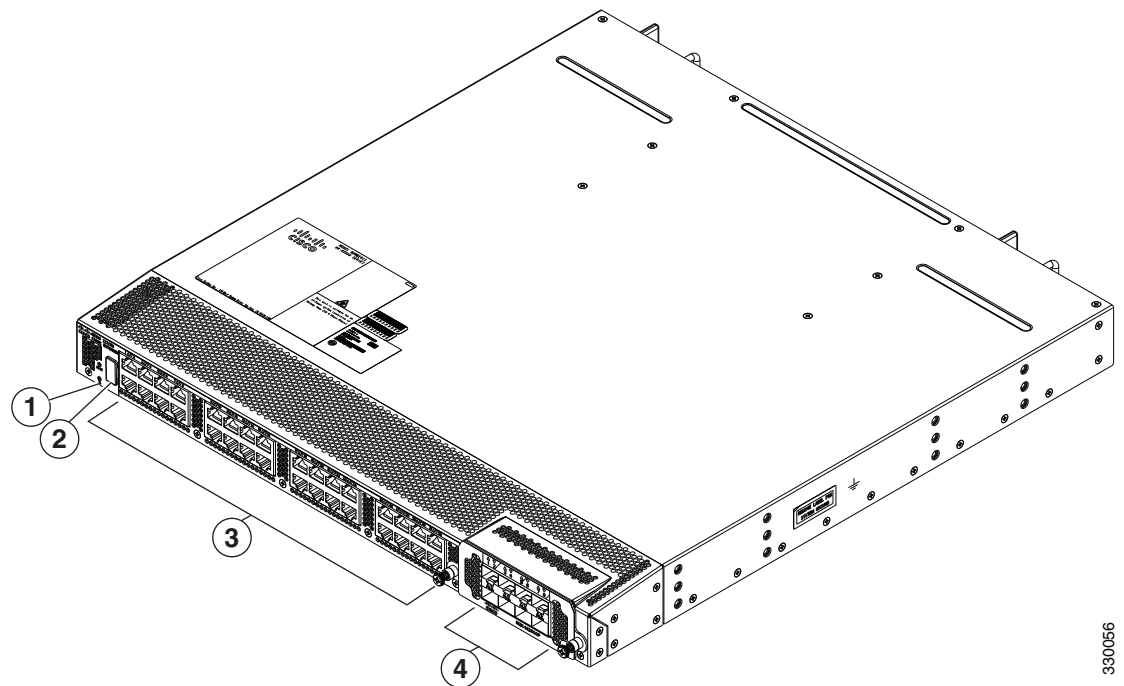
You can order it with front-to-back or back-to-front air cooling, and AC or DC power supplies. If you are going to install the chassis with its front end facing the cold aisle, you must order the chassis with front-to-back airflow. If you are going to install the chassis with its back end facing the cold aisle, you must order the chassis with back-to-front airflow.

Figure 1-18 shows the location of the components on the front of the chassis, and Figure 1-19 shows the location of components on the rear of the chassis. For information on what the chassis and component LEDs indicate, see Table D-1 on page D-2.

Figure 1-18   Front View of the Cisco Nexus 2232TM-10GE Chassis

1	Power supply	3	Power supply
2	Fan tray	4	Status (top) and ID (bottom) LEDs

Figure 1-19   Rear View of the Cisco Nexus 2232TM Chassis

1	Status and ID LEDs	**3**	10-Gigabit Base-T host-facing (downlink) ports (32)
2	HDMI port	**4**	10-Gigabit SFP+ ports (8)

Ports

The Cisco Nexus 2232TM FEX supports a total of 32 10-Gigabit Ethernet ports (SFP+) and 8 10-Gigabit Ethernet/FCoE uplinks (SFP+). SFP transceivers can also be plugged into the SFP+ cages to allow a 1-Gigabit downlink. The Cisco Nexus 2232TM-10GE provides two types of ports: ports for end-host attachment and uplink ports. Uplink ports, which are colored yellow, connect to the upstream parent Cisco Nexus 5000 Series switch.

The Cisco Nexus 2232TM-10GE supports Data Center Bridging (DCB) which increases the reliability, efficiency, and scalability of Ethernet networks by allowing the switches to support multiple traffic classes over a lossless Ethernet fabric. These features allow the switches to support multiple traffic classes over a lossless Ethernet fabric, enabling consolidation of LAN, SAN, and cluster environments.

Figure 1-20 shows the ports on the rear of the Cisco Nexus 2232TM-10GE chassis.

Figure 1-20   Ports Located on the Rear of the Cisco Nexus 2232TM-10GE Chassis

| 1 | Status (top) and ID (bottom) LEDs | 3 | 32 10-Gigabit BaseT host ports |
| 2 | HDMI Connector | 4 | 8 10-Gigabit SFP+ ports |

Power Supplies

The Cisco Nexus 2232TM-10GE FEX chassis has two bays for front-end AC or DC power supplies. This chassis is fully functional with one power supply, but you can install a second power supply for power redundancy. The power supply is hot-swappable during operations.

Table 1-14 lists the power supplies that you can order with the Cisco Nexus 2232TM-10GE FEX.

Table 1-14   Power Supplies for the Cisco Nexus 2232TM-10GE FEX

Power Supply	Part Number
AC power supply with front-to-back airflow	N2K-PAC-400W
AC power supply with back-to-front airflow	N2K-PAC-400W-B
DC power supply with front-to-back airflow	N2K-PDC-400W

Figure 1-12 on page 1-12 shows an AC power supply with front-to-back airflow. Figure 1-13 on page 1-13 shows an AC power supply with back-to-front airflow. Figure 1-14 on page 1-13 shows a DC power supply with front-to-back airflow.

You can order the Cisco Nexus 2232TM-10GE FEX with AC power supplies that have front-to-back or back-to-front airflow for cooling or DC power supplies that have front-to-back airflow. The back-to-front airflow components have a black stripe on their front surface for easy visual identification. The front-to-back airflow components do not have a black stripe.

⚠

Caution   Be sure that all of the power supply and fan tray modules in the same chassis have the same airflow direction and that the air intake for those modules is positioned on a cool aisle. If you install a module that uses a different direction of airflow from the other modules in your system, you will see an error message. If you position a chassis with its modules taking cooling air from a warm aisle, the switch can reach an overtemperature state and shut down.

If one power supply is installed in the chassis, but the other power supply slot is empty, you should use a blank filler panel (N2200-P-BLNK) to cover the empty slot. Figure 1-15 on page 1-14 shows a blank power supply filler panel.

For power supply specifications, see Table B-1 on page B-2. To replace a power supply, see the "Removing and Installing Power Supplies" section on page 3-17.

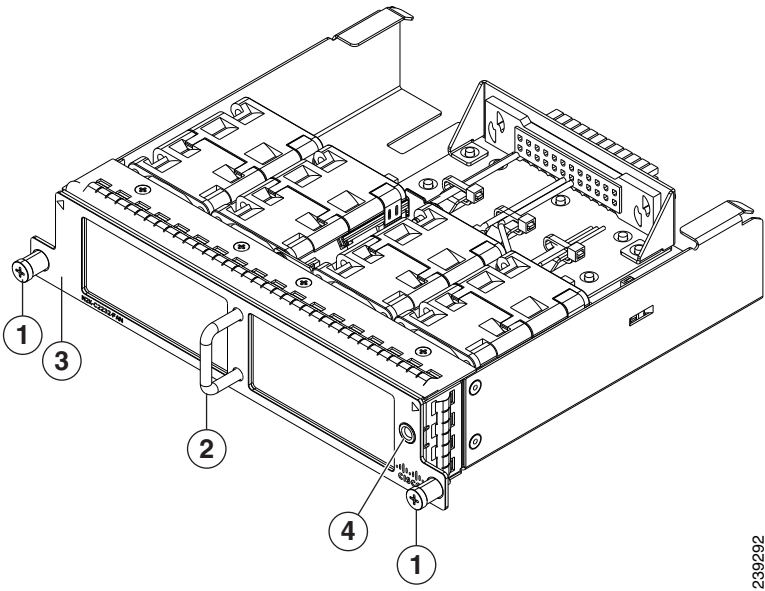For LED descriptions, see Table D-1 on page D-2.

Fan Trays

The Cisco Nexus 2232TM-10GE FEX has one fan tray that is hot swappable during operations. Depending on whether there is a cold aisle in front of or in back of the chassis, you can order front-to-back airflow or back-to-front airflow for the fan tray and the power supplies in the same chassis. Table 1-15 lists the part numbers for each of the fan trays that you can use with this chassis.

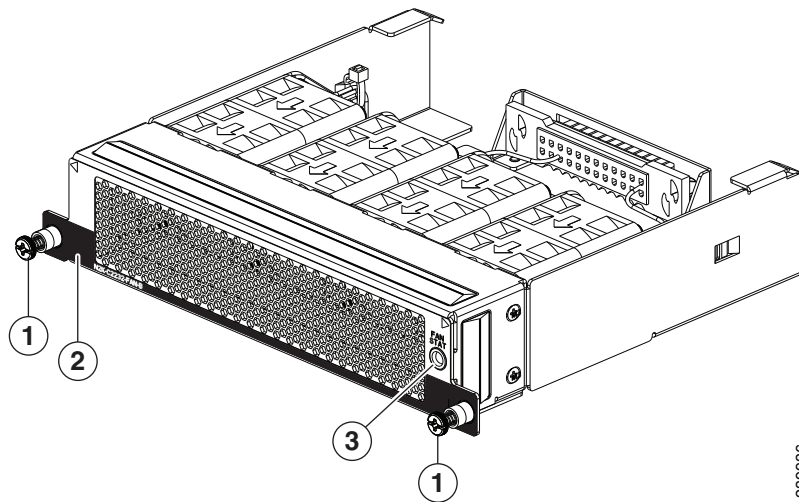*Table 1-15   Fan Trays for the Cisco Nexus 2232TM-10GE FEX*

Description	Part Number
Front-to-back airflow	N2K-C2232-FAN
Back-to-front airflow	N2K-C2232-FAN-B

To see the components used when installing a fan tray, see Figure 1-21 (front-to-back airflow) or Figure 1-22 (back-to-front airflow).

Figure 1-21   Front-to-Back Airflow Fan Tray for the Cisco Nexus 2232TM-10GE FEX

1	Captive screws (2)	**3**	No black stripe indicates front-to-back airflow
2	Handle	**4**	Status LED

Figure 1-22   Back-to-Front Airflow Fan Tray for the Cisco Nexus 2232TM-10GE FEX

1	Captive screws (2)	**3**	Status LED
2	Black stripe indicates back-to-front airflow		

To replace a fan tray, see the "Removing and Installing the Fan Tray" section on page 3-20. For LED descriptions, see Table D-1 on page D-2.

Supported Transceivers and Cables

The Cisco Nexus 2232TM-10GE Series FEX supports SFP+ Ethernet transceivers. This section includes the following topics:

- SFP Transceivers, page 1-26
- SFP+ Copper Cables, page 1-27

SFP Transceivers

The enhanced Small-Form-Factor Pluggable (SFP+) 10-Gigabit Ethernet transceiver is a bidirectional device with a transmitter and receiver. It has a 20-pin connector on the electrical interface and duplex LC connector on the optical interface. Currently, the Cisco Nexus 2000 Series FEX supports the short-range SFP and long-range SFP transceiver. Table 1-16 describes the SFP+ transceivers used with the Cisco Nexus 2232TM-10GE FEX.

Table 1-16   SFP+ Transceivers for the Cisco Nexus 2232TM-10GE FEX

Model	Description
N2200 FET	10-Gigabit Ethernet for connections with a Cisco Nexus 5000 Series switch
SFP-10G-SR	10-Gigabit Ethernet—short range SFP+ module
SFP-10G-LR	10-Gigabit Ethernet—long range SFP+ module

Note The N2K-C2232TF-10GE includes 16 Cisco FEX Transceivers (FET-10G=)

SFP+ Copper Cables

Copper interface cables are available for use with the 10-Gigabit Ethernet SFP+ transceiver. Table 1-17 lists the available cables and provides a brief description of the cables.

Table 1-17   Copper Cables for the Cisco Nexus 2232TM-10GE FEX

Model	Description
SFP-H10GB-CU1M	10-Gigabit BASE-CU SFP+ Passive Cable (1 meter)
SFP-H10GB-CU3M	10-Gigabit BASE-CU SFP+ Passive Cable (3 meters)
SFP-H10GB-CU5M	10-Gigabit BASE-CU SFP+ Passive Cable (5 meters)
SFP-H10GB-CU7MA	10-Gigabit BASE-CU SFP+ Active Cable (7 meters)
SFP-H10GB-CU10MA	10-Gigabit BASE-CU SFP+ Active Cable (10 meters)

1Cisco Nexus 2224TP

The Cisco Nexus 2224TP is a stackable 1 RU FEX. This FEX is very similar to the Cisco Nexus 2248TP except that it has 24 100/1000BASE-T downlink ports, 2 SFP+ uplink ports and you can order it with front-to-back airflow or back-to-front airflow. You can use this FEXwith the Cisco Nexus 5000 Series switch. The Cisco Nexus 2224TP is managed and configured by the upstream switch. The FEX software ships with the Cisco Nexus 5000 Series switch software. The FEX downloads the software image from the switch the same way that a module would download it from the supervisor in a modular chassis.
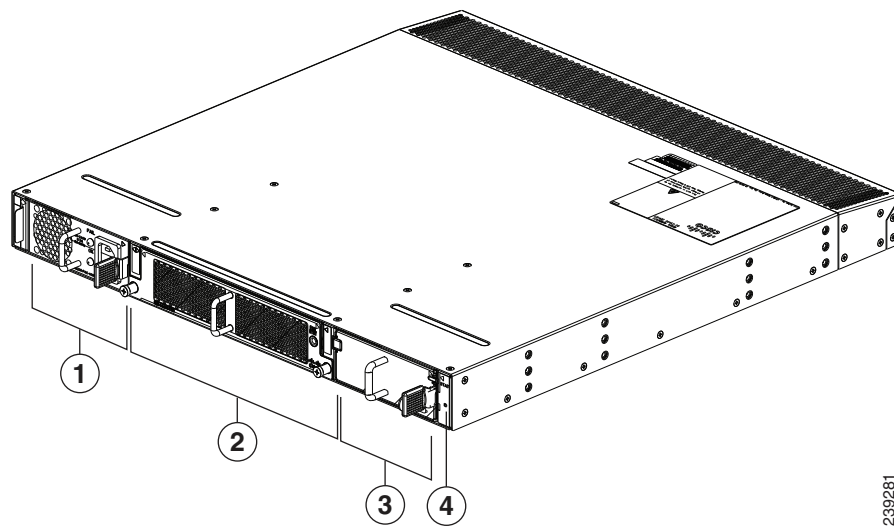
This section includes the following topics:

- Chassis, page 1-28
- Ports, page 1-29
- Power Supplies, page 1-29
- Fan Tray, page 1-30
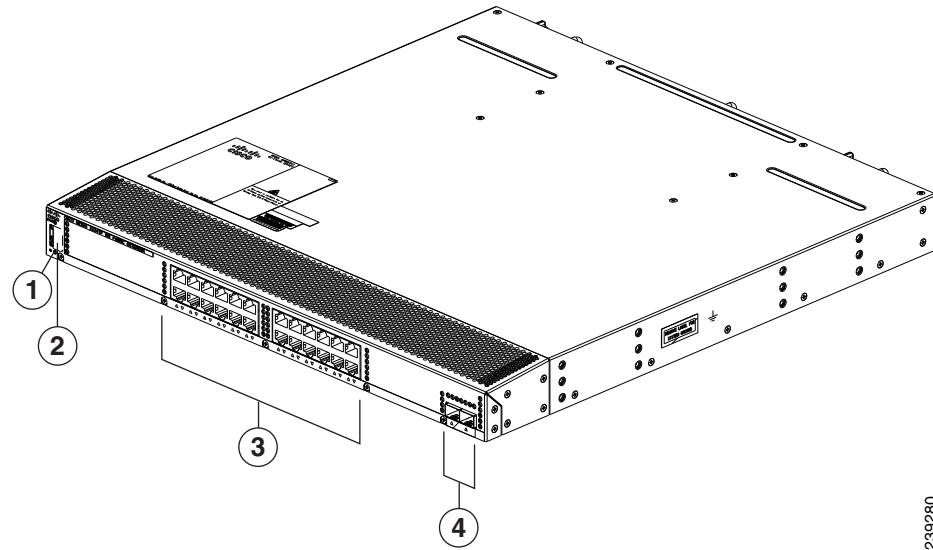- Supported SFP+ Transceivers, page 1-30

Chassis

The Cisco Nexus 2224TP chassis has a height of 1.72 inches (4.37 cm), a width of 17.34 inches (44.04 cm), and a depth of 18.9 inches (48.1 cm). It weighs 18 pounds (8.0 kg). Its one-rack-unit (1 RU) form factor takes up relatively little space, making it easy to incorporate into rack designs. The FEX is mounted in a standard 19-inch (48.26-cm) rack. It has front-to-back or back-to-front airflow for cooling. All switch ports are located at the rear of the unit in close proximity to server ports, and all user-serviceable components are accessible from the front panel.

Figure 1-23 shows the location of the components on the front of the chassis, and Figure 1-24 shows the location of components on the rear of the chassis. For information on what the chassis and component LEDs indicate, see Table D-1 on page D-2.

Figure 1-23   Front of the Cisco Nexus 2224TP Chassis

1	Power supply	3	Power supply (blank power supply shown)
2	Fan tray (1)	4	Status (top) and ID (bottom) LEDs

Figure 1-24   Rear View of the Nexus 2224TP Chassis

| 1 | Status (top) and ID (bottom) LEDs | 3 | 100/1000BASE-T data ports (24) |
| 2 | HDMI port | 4 | SFP+ uplink ports (2) |

Ports

The Cisco Nexus 2224TP FEX supports a total of 24 100/1000BASE-T downlink ports and two SFP+ uplink ports on the rear panel. There is an HDMI port on the rear panel for console and management port connectivity. Uplink ports are colored yellow for connectivity to the upstream parent Cisco Nexus 5000 Series switch.

Power Supplies

The Cisco Nexus 2224TP FEX chassis has two bays for front-end AC or DC power supplies (the same power supplies used for the Cisco Nexus 2248TP). This chassis is fully functional with one power supply, but you can install a second power supply for power redundancy. The power supply is hot swappable during operations.

Table 1-18 lists the power supplies that you can order with the Cisco Nexus 2224TP FEX.

Table 1-18   Power Supplies for the Cisco Nexus 2224TP FEX

Power Supply	Part Number
AC power supply with front-to-back airflow	N2200-PAC-400W
AC power supply with back-to-front airflow	N2200-PAC-400W-B
DC power supply with front-to-back airflow	N2200-PDC-400W
DC power supply with back-to-front airflow	N2200-PDC-350W-B

To see the components that you use when installing a power supply unit, see Figure 1-12 on page 1-12 for the AC power supply with front-to-back airflow, Figure 1-13 on page 1-13 for the AC power supply with back-to-front airflow, and Figure 1-14 on page 1-13 for the DC power supply with front-to-back airflow.

You can order the Cisco Nexus 2224TP FEX with AC power supplies that have front-to-back or back-to-front airflow for cooling or DC power supplies that have front-to-back airflow. The back-to-front airflow components have a black stripe on their front surface for easy visual identification. The front-to-back airflow components do not have a black stripe.

⚠ **Caution**   Be sure that all of the power supply and fan tray modules in the same chassis have the same airflow direction and that the air intake for those modules is positioned on a cool aisle. If you install a module that uses a different direction of airflow from the other modules in your system, you will see an error message. If you position a chassis with its modules taking cooling air from a warm aisle, the switch can reach an overtemperature state and shut down.

If one power supply is installed in the chassis, but the other power supply slot is empty, you should use a blank filler panel to cover the empty slot. Figure 1-15 on page 1-14 shows a blank power supply filler panel.

For power supply specifications, see Table B-1 on page B-2. To replace a power supply, see the "Removing and Installing Power Supplies" section on page 3-17.

Fan Tray

The Cisco Nexus 2224TP FEX has one fan tray that is hot swappable during operations. Depending on whether there is a cold aisle in front of or in back of the chassis, you can order front-to-back airflow or back-to-front airflow for the fan tray and the power supplies in the same chassis. Table 1-19 lists the part numbers for each of the fan trays that you can use with this chassis.

Table 1-19   Fan Trays for the Cisco Nexus 2224TP and 2248TP FEXs

Description	Part Number
Front-to-back airflow	N2K-C2248-FAN
Back-to-front airflow	N2K-C2248-FAN-B

To see the components used when installing one of these fan trays, see Figure 1-16 (front-to-back airflow) or Figure 1-17 (back-to-front airflow).

To replace a fan tray, see the "Removing and Installing the Fan Tray" section on page 3-20. For LED descriptions, see Table D-1 on page D-2.

Supported SFP+ Transceivers

The Cisco Nexus 2224TP FEX supports SFP+ Ethernet transceivers. This section includes the following topics:

- SFP+ Transceivers, page 1-31
- SFP+ Copper Cables, page 1-31

SFP+ Transceivers

The enhanced Small-Form-Factor Pluggable (SFP+) 10-Gigabit Ethernet transceiver is a bidirectional device with a transmitter and receiver. It has a 20-pin connector on the electrical interface and duplex LC connector on the optical interface. Currently, the Cisco Nexus 2224TP FEX supports the short-range SFP and long-range SFP transceiver. Table 1-20 describes the SFP+ transceivers used with the Cisco Nexus 2224TP FEX.

Table 1-20   SFP+ Transceivers Used with the Cisco Nexus 2224TP FEX

Model	Description
N2200 FET	10-Gigabit Ethernet for connections with a Cisco Nexus 5000 Series switch
SFP-10G-SR	10-Gigabit Ethernet—short range SFP+ module
SFP-10G-LR	10-Gigabit Ethernet—long range SFP+ module

SFP+ Copper Cables

Copper interface cables are available for use with the 10-Gigabit Ethernet SFP+ transceiver. Table 1-21 lists the available cables and provides a brief description of the cables.

Table 1-21   Copper Cables Used with the Cisco Nexus 2224TP FEX

Model	Description
SFP-H10GB-CU1M	10-Gigabit BASE-CU SFP+ Passive Cable (1 meter)
SFP-H10GB-CU3M	10-Gigabit BASE-CU SFP+ Passive Cable (3 meters)
SFP-H10GB-CU5M	10-Gigabit BASE-CU SFP+ Passive Cable (5 meters)
SFP-H10GB-CU7MA	10-Gigabit BASE-CU SFP+ Active Cable (7 meters)
SFP-H10GB-CU10MA	10-Gigabit BASE-CU SFP+ Active Cable (10 meters)

Cisco Nexus 2148T

The Cisco Nexus 2148T FEX is a 1 RU device that acts as a remote I/O module on the Cisco Nexus 5000 Series switch. All device configurations are managed on the switch and configuration information is downloaded through inband communication to the FEX. You can use this FEX with the Cisco Nexus

5000 Series switch. The FEX software ships with the Cisco Nexus 5000 Series switch software. The FEX downloads the software image from the switch the same way that a module would download it from the supervisor in a modular chassis.

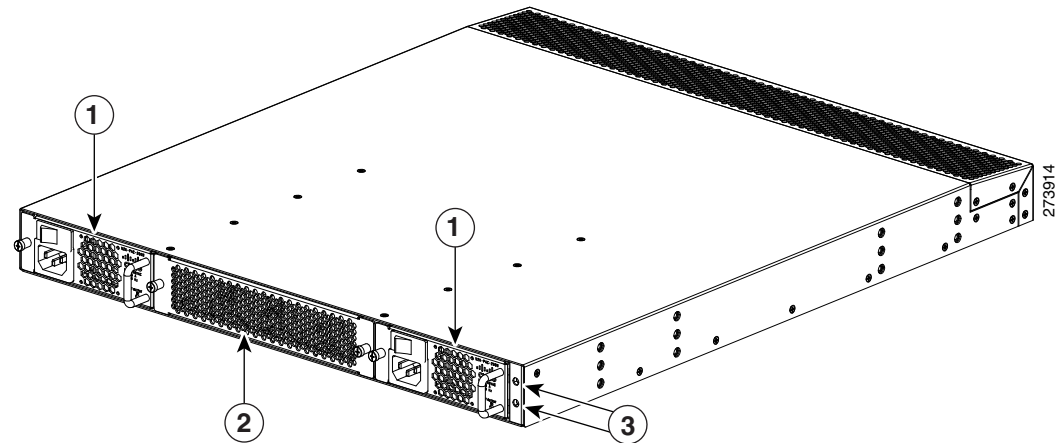This section includes the following topics:

Features

The Cisco Nexus 2148T FEX has the following features:

- Forty-eight 1-Gigabit Ethernet ports
- Four 10-Gigabit Ethernet ports
- Redundant (dual) 200-W modular, hot-swappable power supplies with a power switch on each supply
- Removable fan tray with redundant fans. The fan tray can be removed for hot swapping. If it is not replaced within 60 seconds, the system shuts down.
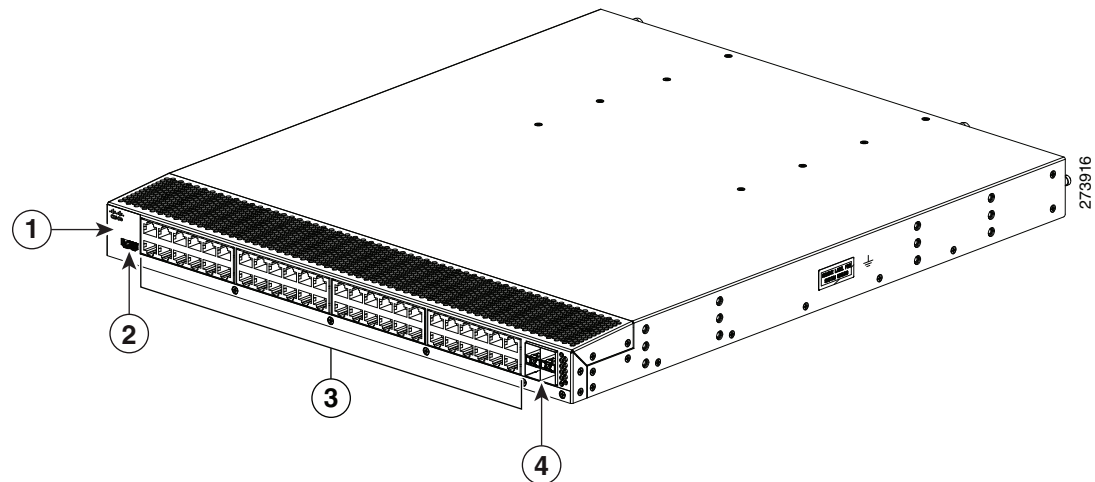- Front-to-back airflow

Chassis

The Cisco Nexus 2148T FEX has a height of 1.72 inches (4.37 cm), a width of 17.3 inches (43.94 cm), and a depth of 20 inches (50.8 cm). The FEX is mounted in a standard 19-inch (48.24 cm) rack. The chassis requires 1 RU. One fan tray and two power supplies are located at the front of the device. The ports are located at the rear of the device. The airflow through the fan tray and power supplies is from front to back.

Figure 1-25 identifies the front view of the Cisco Nexus 2148T FEX.

Figure 1-25   Front View of the Cisco Nexus 2148T FEX

1	Power supply (two)	**3**	Status (top) and ID (bottom) LEDs
2	Fan tray (1)		

The rear of the Cisco Nexus 2148T FEX has 48 1-Gigabit Ethernet ports, 4 10-Gigabit Ethernet ports, and status and ID LEDs. Figure 1-26 identifies the components found on the rear of the Cisco Nexus 2148T FEX.

Figure 1-26   Rear View of the Cisco Nexus 2148T FEX

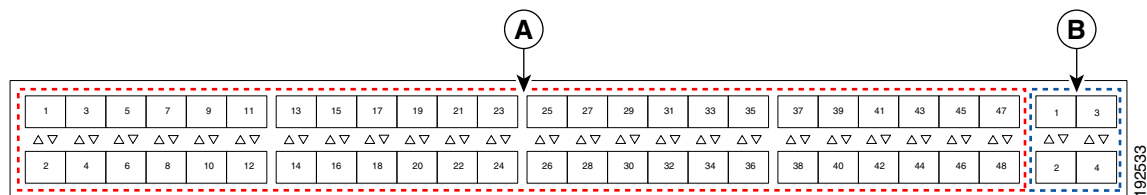| **1**	System status (top) and Beacon (bottom) LED	**3**	1-Gigabit Ethernet downlink ports (48)
2	HDMI port	**4**	10-Gigabit Ethernet uplink ports (4)

Ports

Each port on the Cisco Nexus 2148T FEX is numbered, and groups of ports are numbered based on their function. The ports are numbered from top to bottom and left to right.

Group 1 includes 48 1-Gigabit Ethernet data ports. Group 2 includes four 10-Gigabit Ethernet ports. Figure 1-27 shows how ports are numbered and grouped by function.

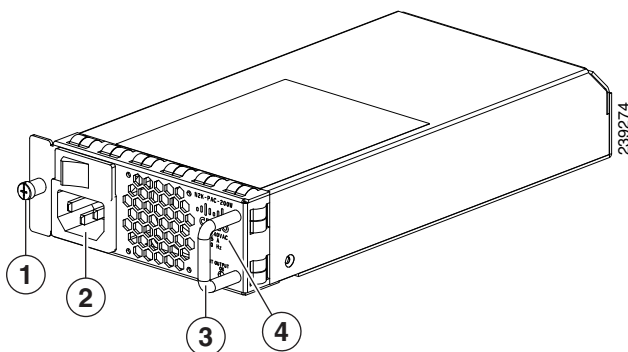*Figure 1-27   Port Numbering on the Cisco Nexus 2148T FEX*

1	Group 1: Data ports 1 through 48	**2**	Group 2: Uplink ports 1 through 4

Power Supplies

The Cisco Nexus 2148T FEX uses a front-end 200-W AC power supply that has front-to-back airflow. The chassis has two bays for two power supplies. Two power supplies can be used for redundancy, but the Cisco Nexus 2148T FEX is fully functional with one power supply. Figure 1-28 shows the power supply with two LEDs: one for power status and one for a failure condition. The power supply is hot-swappable. For details on how to install a power supply, see the "Removing and Installing Power Supplies" section on page 3-17.
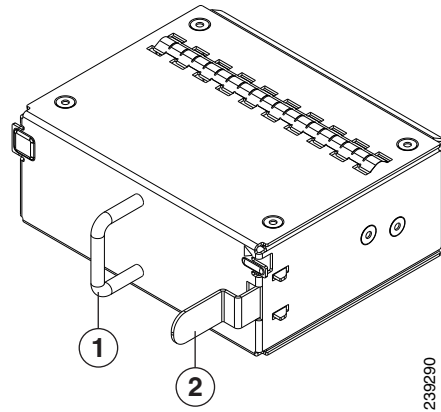
Figure 1-28   AC Power Supply for the Cisco Nexus 2148T Series FEX

1	Green power LED indicates the power status.	**2**	Amber fail LED indicates a failure condition.

If one power supply is installed in the chassis, but the other power supply slot is empty, you should use a blank filler panel to cover the empty slot. Figure 1-29 shows a blank power supply filler panel.
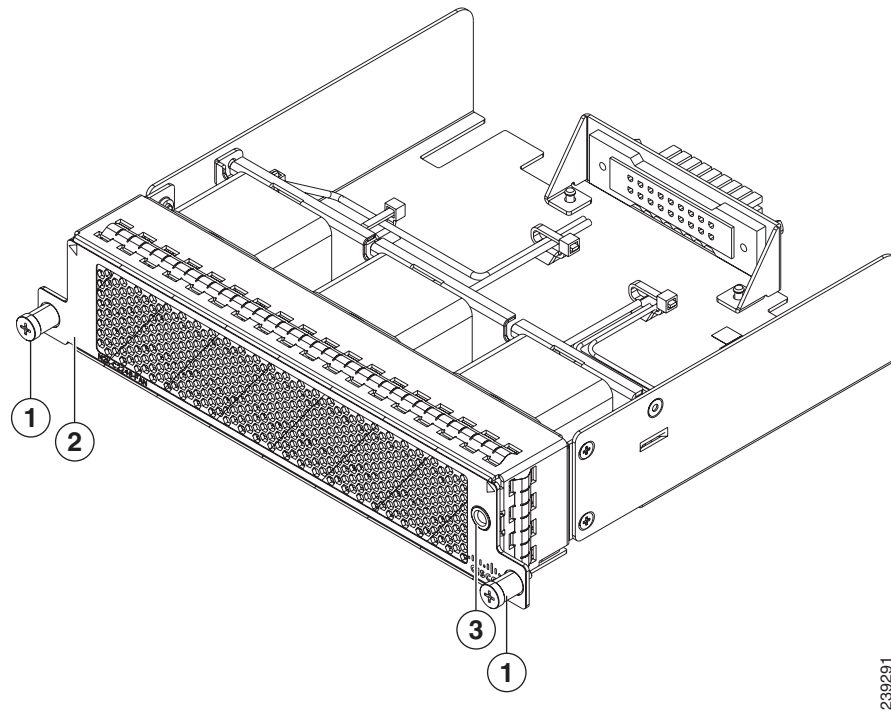
Figure 1-29   Blank Power Supply Filler Panel

1	Handle	**2**	Ejector latch

Fan Tray

The Cisco Nexus 2148T FEX has one fan tray that has front-to-back airflow. Figure 1-30 shows the fan tray. The fan tray is hot-swappable as long as you replace it within 60 seconds.

Figure 1-30   Front-to-Back Airflow Fan Tray for Cisco Nexus 2148T FEX

1	Captive screws (2)	**2**	Staus LED
3	No blck stripe indicates front-to-back airflow		

Supported SFP Transceivers

The Cisco Nexus 2148T FEX supports SFP+ Ethernet transceivers. This section includes the following topics:

- SFP Transceivers, page 1-36
- SFP+ Copper Cables, page 1-36

SFP Transceivers

The enhanced Small-Form-Factor Pluggable (SFP+) 10-Gigabit Ethernet transceiver is a bidirectional device with a transmitter and receiver. It has a 20-pin connector on the electrical interface and duplex LC connector on the optical interface. Currently, the Cisco Nexus 2000 Series FEX supports the short-range SFP and long-range SFP transceiver. Table 1-22 describes the SFP+ transceivers used with the Cisco Nexus 2148T FEX.

Table 1-22   SFP+ Transceivers Used with the Cisco Nexus 2148T FEX

Model	**Description**
SFP-10G-SR	10-Gigabit Ethernet—short range SFP+ module
SFP-10G-LR	10-Gigabit Ethernet—long range SFP+ module

SFP+ Copper Cables

Copper interface cables are available for use with the 10-Gigabit Ethernet SFP+ transceiver. Table 1-23 lists the available cables and provides a brief description of the cables.

Table 1-23   Copper Cables Used with the Cisco Nexus 2148T FEX

Model	**Description**
SFP-H10GB-CU1M	10-Gigabit BASE-CU SFP+ Passive Cable (1 meter)
SFP-H10GB-CU3M	10-Gigabit BASE-CU SFP+ Passive Cable (3 meters)
SFP-H10GB-CU5M	10-Gigabit BASE-CU SFP+ Passive Cable (5 meters)

Table 1-23   *Copper Cables Used with the Cisco Nexus 2148T FEX*

Model	Description
SFP-H10GB-CU7MA	10-Gigabit BASE-CU SFP+ Active Cable (7 meters)
SFP-H10GB-CU10MA	10-Gigabit BASE-CU SFP+ Active Cable (10 meters)